Legionellosis

1. DISEASE REPORTING

A. Purpose of Reporting and Surveillance

1. To identify sources of transmission (e.g., contaminated water source) and prevent further transmission from such a source.
2. To identify outbreaks and educate potentially exposed persons about signs and symptoms of disease, thereby facilitating early diagnosis and treatment.

B. Legal Reporting Requirements

1. Health care providers: notifiable to local health jurisdiction within 3 work days
2. Hospitals: notifiable to local health jurisdiction within 3 work days
3. Laboratories: no requirements for reporting; specimen submission is not required
4. Local health jurisdictions: notifiable to the Washington State Department of Health (DOH) Communicable Disease Epidemiology Section (CDES) within 7 days of case investigation completion or summary information required within 21 days

C. Local Health Jurisdiction Investigation Responsibilities

1. Begin follow-up investigation within one working day.
2. Encourage laboratories to forward the first isolate from each patient to Public Health Laboratories for molecular studies in the event a subsequent cluster is detected.
3. Report all *confirmed* and *suspect* cases (see definition below) to CDES. Complete the legionellosis report form (available at http://www.doh.wa.gov/notify/forms/legion.doc) and enter the data into the Public Health Issues Management System (PHIMS).

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Legionella are Gram-negative bacilli. Approximately 20 different species can cause human disease but most recognized infections (~80%) are caused by *L. pneumophila* serogroup 1. Other species known to cause disease include *L. micadei*, *L. bozemanii*, and *L. longbeachae*. Legionellae thrive in warm, aquatic environments and are relatively resistant to the effects of chlorine and heat. The organisms survive for extended periods in tap and distilled water. They do not colonize the human respiratory tract.

B. Description of Illness

Legionellosis was first recognized following a 1976 outbreak of pneumonia involving American Legion convention delegates, named by the press "Legionnaires' disease". Illness is usually associated with two clinically and epidemiologically distinct syndromes: Legionnaires' disease, a potentially fatal form of pneumonia, and Pontiac fever, a self-limited "flu-like" illness without pneumonia. Persons with Legionnaires' disease may present early in the illness with nonspecific symptoms including fever, malaise, myalgia,

anorexia, and headache. Cough may be only slightly productive, and chest pain, occasionally pleuritic, can be prominent. Gastrointestinal symptoms, especially diarrhea, occur in 20–40% percent of cases. Chest x-rays almost always show a pneumonia. Pontiac fever is a milder, self-limited illness. Persons at increased risk for infection include persons over 50 years of age, those with chronic diseases such as COPD or diabetes, and immunosuppressed people.

C. Legionellosis in Washington

During recent years, between 7 and 25 cases have been reported annually.

D. Reservoirs

Water is the primary reservoir. *Legionella* bacteria can survive for extended periods in tap and distilled water. A variety of natural and man-made aqueous sources have been implicated, including warm, stagnant water such as that found in, or aerosolized from sources such as: plumbing systems, hot water tanks, shower heads and faucets, cooling towers, evaporative condensers of large air-conditioning systems, whirlpool spas, respiratory therapy equipment, ultrasonic misters, humidifiers, and decorative fountains.

Potting soil has been associated with infections with *L. longbeachae,* a serogroup uncommon in the United States.

E. Modes of Transmission

Legionellosis is generally acquired by inhalation of contaminated aerosols, but can also be acquired through microaspiration of infected water. In addition, legionellosis may also be transmitted through contaminated soil (MMWR 2000;49(34):777–9). Person-to-person transmission has not been documented.

F. Incubation Period

For Legionnaires' disease, 2–10 days (average 5–6 days); for Pontiac fever, 5–66 hours (average 24–48 hours).

G. Period of Communicability

Person to person transmission has not been documented.

H. Treatment

For Legionnaires' disease, azithromycin or levofloxicin IV is the treatment of choice for persons hospitalized with pneumonia or immunocompromised persons. Delay in treatment is associated with increased mortality rates.

Pontiac fever requires no specific treatment.

3. CASE DEFINITIONS

A. Clinical Criteria for Diagnosis

Legionellosis is associated with two clinically and epidemiologically distinct illnesses: Legionnaires' disease, which is characterized by fever, myalgia, cough, and clinical or radiographic pneumonia; and Pontiac fever, a milder illness without pneumonia.

B. Laboratory Criteria for Diagnosis

1. *Suspect*:
   - By seroconversion: fourfold or greater rise in antibody titer to specific species or serogroups of *Legionella* other than *L. pneumophila* serogroup 1 *(*e.g., *L. micdadei*, *L. pneumophila* serogroup 6).
   - By seroconversion: fourfold or greater rise in antibody titer to multiple species of *Legionella* using pooled antigen and validated reagents.
   - By the detection of specific *Legionella* antigen or staining of the organism in respiratory secretions, lung tissue, or pleural fluid by direct fluorescent antibody (DFA) staining, immunohistochemstry (IHC), or other similar method, using validated reagents.
   - By detection of *Legionella* species by a validated nucleic acid assay.
2. *Confirmed:*
   - By culture: isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid.
   - By detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents.
   - By seroconversion: fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents.

C. Case Definition (2005)

1. *Suspect*: a clinically compatible case that meets at least one of the presumptive (suspect) laboratory criteria.
   - Travel-associated: a case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the ten days before onset of illness.
2. *Confirmed*: a clinically compatible case that meets at least one of the confirmatory laboratory criteria.
   - Travel-associated: a case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the ten days before onset of illness.

4. DIAGNOSIS AND LABORATORY SERVICES

A. Laboratory Diagnosis

Urinary antigen assay **and** culture of respiratory secretions on selective media are together the preferred diagnostic tests for confirming Legionnaires' disease.

- Urine antigen tests: Rapid immunoassays are available commercially to detect *Legionella* antigens in urine. The test has good sensitivity (70–80%) for detecting *Legionella pneumophila* serogroup 1 antigen (80% of cases) but poor sensitivity (5%) for detecting other *L. pneumophila* serogroups and other species.

- Culture: *Legionella* bacteria can be isolated from lower respiratory tract secretions, lung tissue, and pleural fluid by using special media. The sensitivity of culture is highly variable depending on the severity of illness and experience of the laboratorian performing the test. The advantage of culture is that it will detect all species and allow for comparison with environmental samples, if available.
- Serologic tests: Demonstrating a four fold rise in antibodies to *L. pneumophila* serogroup 1 can confirm the diagnosis but is more useful for epidemiologic investigations than for clinical use. An acute serum specimen should be collected when the diagnosis is suspected (during the acute phase of illness) and the convalescent serum specimen should be collected at 4, 6 and 12 weeks after onset.
- PCR: At present, there are no commercial PCR tests which have been validated for *Legionella*.

B. Services Available at the Washington State Public Health Laboratories (PHL)

PHL performs culture on respiratory specimens, and speciation and pulsed-field gel electrophoresis (PFGE) on isolates. Isolates with the same PFGE pattern may be consistent with but do not prove a common source, whereas isolates with different PFGE patterns presumptively came from different sources.

C. Specimen Collection

Isolates should be submitted to PHL on media that support their growth. In the event of an outbreak, contact CDES for assistance in determining which additional specimens should be collected for laboratory study.

Specimens shipped to PHL should include a completed DOH Reference Bacteriology form http://www.doh.wa.gov/EHSPHL/PHL/Forms/ReferenceBacteriology.pdf.

5. ROUTINE CASE INVESTIGATION

Interview the case and others who may be able to provide pertinent information. As most cases of legionellosis present as sporadic disease, routine case investigation is limited to collecting information on demographics, the basis of diagnosis, risk factors for disease, and potential sources of infection.

A. Evaluate the Diagnosis

Using the case report form, itemize signs and symptoms. Obtain copies of laboratory reports that support the diagnosis. Urinary antigen assay **and** culture for the organism are together the preferred diagnostic tests for confirming Legionnaires' disease.

B. Identify Potential Sources of Infection

Ask about potential exposures in the 2–10 days prior to onset including:

- Time spent in a hospital as an inpatient, outpatient or employee;
- Exposure to aerosolized water (e.g., fountain, whirlpool spa, hot tub, humidifier, evaporative condenser, nebulizer, grocery store misting machine);
- Travel;
- Spending as least one night away from the home; and

- Exposure to soil.

Investigate all nosocomial cases, particularly persons hospitalized during the entire exposure period (See Managing Special Situations).

Investigate all travel-associated cases (See Managing Special Situations).

C. Identify Potentially Exposed Persons

Promptly report possible nosocomial or travel-associated cases to Communicable Disease Epidemiology Section. Increased surveillance may be appropriate for associated groups.

D. Environmental Evaluation

Unless circumstances indicate that an outbreak may be occurring (See Managing Special Situations), further investigation is not indicated.

6. CONTROLLING FURTHER SPREAD

A. Infection Control Recommendations / Case Management

Hospitalized patients should be cared for using standard precautions.

B. Contact Management

No prophylaxis is indicated for household/contacts; person-to-person transmission has not yet been demonstrated.

C. Environmental Measures

An environmental investigation would only be undertaken in the course of an outbreak investigation (See Managing Special Situations).

7. MANAGING SPECIAL SITUATIONS

A. Nosocomial Case

A definite nosocomial case is defined as a patient hospitalized continuously for ≥ 10 days before onset of *Legionella* infection. A possible nosocomial case is defined as a patient hospitalized 2–9 days before onset of *Legionella* infection.

If a possible or definite nosocomial case is identified, Communicable Disease Epidemiology recommends that the local health jurisdiction:

- Notify the facility where the patient was hospitalized.
- Recommend that the facility perform a retrospective review of nosocomial pneumonia cases.
- Recommend testing suspect cases of nosocomial pneumonia for legionellosis including culture, and submitting isolates to Public Health Laboratories for PFGE analysis.

The extent of the environmental investigation will depend on the circumstances of the situations. Consult with Communicable Disease Epidemiology about the need for an environmental investigation. If a facility water source is implicated, Public Health Laboratories can assist with water testing. For additional resources regarding assessing and testing water systems for *Legionella* see: http://www.cdc.gov/legionella/index.htm

B. Travel-Associated Case

A travel-associated case is defined as a case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the ten days before onset of illness.

- Report cases promptly to Communicable Disease Epidemiology Section, particularly cases with potential exposures involving out-of-state or cruise ship travel. These situations will be reported to the CDC.
- Obtain lodging or cruise ship information including facility name, address, and dates spent at the facility.
- Ask about others in the travel group who may be ill.
- Recommend testing suspect pneumonia cases for legionellosis including culture.

C. Community Outbreaks

Many outbreaks, community and nosocomial, have been attributed to *Legionella spp.* in the decades since the 1976 American Legion Convention in Philadelphia. If a cluster of legionellosis is suspected, confirmation and investigation are warranted, as morbidity may be significant and mortality high (up to 40%), and reservoirs may be found and eliminated. Contact Communicable Disease Epidemiology Section to discuss possible outbreaks. Such investigations may involve complex questionnaires and detailed environmental evaluations.

8. ROUTINE PREVENTION

A. Immunization Recommendations: None

B. Prevention Recommendations

Consult available resources for environmental recommendations:
http://www.cdc.gov/legionella/index.htm

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UPDATES